



Storport Miniport Driver

Version 2.10

for Windows Server 2003

Windows Server 2008

Server Core Installation Option of Windows 2008

User Manual

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Installation

Introduction

AutoPilot Installer® for Emulex® Storport Miniport drivers provides installation options that include simple installations with a few mouse clicks, custom unattended installations that use predefined script files and text-only installations. AutoPilot Installer is included with Emulex drivers and utilities in Windows executable files (driver kit installers) that you can download from the Emulex Web site.

There are two types of driver kits that can install the Emulex Storport Miniport driver and utilities:

- **Full Installation Driver kit (full driver kit)** - Includes the Emulex Storport Miniport driver and the complete HBAware® utility set, including a Graphical User Interface (GUI) and a Command Line Interface (CLI). The full driver kit also provides an option to create AutoPilot Installer kits that you can customize and distribute on your network. Although the full driver kit will not install on the Server Core installation option of Windows Server 2008 (Server Core), it can be used to create kits for those platforms.
- **Core Installation Driver kit (core driver kit)** - Includes the Emulex Storport Miniport driver and the HBAware utility CLI, but not the HBAware utility GUI. The core driver kit is required for use with Server Core platforms. You can only customize the core driver kit on the system where it is installed. It cannot be used to create AutoPilot Installer Kits for other platforms.

Run one of the driver kit installers to extract all of the software needed for an installation, then complete the installation using AutoPilot Installer. You can install a driver by any of the following methods:

Note: These installation methods are not mutually exclusive.

Hardware-first installation. At least one Emulex adapter is installed before you install the Emulex drivers and utilities.

Software-first installation. You can install drivers and utilities using AutoPilot Installer prior to the installation of any adapters. You do not need to specify the model of any adapters to be installed later. The appropriate drivers and utilities automatically load when you install the adapters.

Utility Only update. If the Storport Miniport driver in the driver kit is the same version as what is already installed on the system, you can reinstall or update the previously installed utility without reinstalling the Storport Miniport driver.

Text-Only installation. Text-based installation mode is used automatically when AutoPilot Installer is run on a Server Core system.

Network installation. You can place the driver kit installers on a shared network drive and install them across your local area network (LAN). You can use the full driver kit to create your own AutoPilot Installer kits for network-based installation. Network-based installation is often used in conjunction with unattended installation and scripting. This allows you to configure and install the same driver and utility versions on all the hosts in a SAN.

Unattended installation. You can run the driver kit installers and AutoPilot Installer with no user interaction from a command line or script. Unattended installation works for both hardware-first and software-first installations and with both the full driver kit and the core driver kit. An unattended installation operates in silent mode (sometimes referred to as quiet mode) and creates an extensive report file with installation status.

Important Considerations

New in This Release

- Support for converged network adapters.
- Utility-only update (see “Utility-Only Update” on page 10.)
- Command line parameters for silent installation.
- Support for the Server Core installation option of Windows Server 2008. A text-only mode has been added to AutoPilot Installer for Server Core systems.
- Support to change the management port number.
- Support for Windows Server 2008 Hyper-V.
- Support to run the HBAnyware utility in read-only mode.

Changing Driver Types

If you currently use a SCSIport Miniport or FC Port driver, the driver will be replaced when you install Storport Miniport driver version 2.10. Storport Miniport driver version 2.10 will be installed for all HBAs on the server. You will also lose your customized driver parameters, persistent bindings, LUN masking and LUN mapping. The default parameters set with AutoPilot Installer will usually be the best options. However, you may want to note your current settings before you install Storport Miniport driver version 2.10. After the installation, you can then update your customized driver parameters.

Note: This update process can leave files associated with old driver kits on your system. After running AutoPilot Installer and restarting your system, you may be required to uninstall old driver or utility program entries. Follow the procedures in the “Uninstalling Programs” section in the Storport Miniport driver User Manual. Ensure you delete only previous driver and utility versions.

Minimum Software Requirements

AutoPilot Installer will not let you perform an installation if the minimum Windows service pack or Microsoft Storport driver update is not installed.

Known Issues

The following issues have been reported at the time of publication. These issues may not yet have been verified or confirmed and may apply to another product, such as hardware.

- Do not perform software-first installations on Windows Server 2008 or Vista systems. The procedure documented in “Software-First Installation” on page 10 might not have the expected effect. No error will be reported, but Windows might continue using the version of the driver distributed with the operating system rather than the new driver when an adapter is installed. The problem occurs because Microsoft-distributed drivers are versioned differently than Emulex-distributed drivers.
- To revert to older drivers after installing one of the 2.10 driver kits, you must uninstall all Emulex software and drivers before installing the older driver kit. Failure to do so could leave your system in an unsupported state. See “Uninstallation” on page 32 for all the procedures you must follow.

Storport Miniport Driver Information

Prerequisites

- One of the following operating systems:
 - Windows Server 2003 SP2 running on an x86, x64 or Itanium server.
 - Windows Server 2008 running on an x86, x64 or Itanium server.
 - Server Core installation option of Windows Server 2008 running on an x86 or x64 server.
 - Windows Vista SP1 running on an x86 or x64 platform.
- Minimum 512 MB memory.
- See the Emulex Web site for required updates to the Microsoft Storport driver.

Compatibility

- The Emulex Storport Miniport driver is compatible with the following Emulex adapters:
 - LP21002 and LP21000 converged network adapters (CNAs) (minimum firmware version 1.00a4)
-
- Note:** The LP21002 and LP21000 CNAs do not support Windows Server 2003/2008 on Itanium servers
-
- LPe12002, LPe12000 and LPe1250 adapters (minimum firmware version 1.00a9)
 - LPe11004, LPe11002, LPe11000 and LPe1150 adapters (minimum firmware version 2.72a2)
 - LP11002, LP11000 and LP1150 adapters (minimum firmware version 2.72a2)
 - LP10000DC, LP10000, LP1050DC and LP1050 adapters (minimum firmware version 1.91a5)
 - LP10000ExDC and LP1050Ex adapters (minimum firmware version 1.91a5)
 - LP9802DC, LP9802 and LP982 adapters (minimum firmware version 1.91a5)
 - LP9402DC, LP9002DC, LP9002L, LP9000 & LP952L adapters (minimum firmware version 3.93a0)
- x86 BootBIOS - LP21002 and LP21000, minimum version 2.02a1; LPe12002 LPe12000 and LPe1250, minimum version 2.01a2; all other adapter models, minimum version 1.71a0.
 - EFIBoot - (LP21002 and LP21000 are not supported) LPe12002, LPe12000 and LPe1250, minimum version 4.00a1; all other adapter models, minimum 3.11a5.
 - This version of the driver is compatible with version 4.0 of the HBAnyware utility. This is the version of HBAnyware that is included in the driver kit. Version 4.0 of the HBAnyware utility is not compatible with earlier versions of the Emulex Storport Miniport driver on the same server.

Driver Kit Installer Overview

The driver kit installer is an executable file that self-extracts and copies the following software onto your system:

- AutoPilot Installer - Installs drivers and runs the HBAnyware utilities installer.
- Storport Miniport driver - Manages communication and data transfer between applications and I/O devices, using Emulex adapters as agents. There are separate drivers for Emulex host bus adapters (HBAs) and converged network adapters (CNAs).
- ElxPlus driver - Supports the HBAnyware utility, persistent binding and LUN mapping and masking.
- HBAnyware utility installer- Installs HBAnyware utilities and services. These monitor and perform configuration tasks on remote and local adapters.
- HBAnyware Security Configurator - Controls which HBAnyware systems can remotely access and manage adapters on other systems in a Storage Area Network (SAN).

After the driver kit is installed, you have three options:

- Automatically run AutoPilot Installer immediately. This is the default option. See page 6 for more information.
- Explicitly run AutoPilot Installer later on your system. See page 7 for more information.
- Create an AutoPilot Installer kit that can be customized and used to run AutoPilot Installer on your system or another system. See page 7 for more information.

Note: The third option is only available when installing the full driver kit. While the full driver kit cannot be installed on Server Core systems, it can be used to create AutoPilot Installer Kits for those systems.

Files Installed by the Driver Kit Installer

The driver kit installer copies the AutoPilot Installer Files to your system. By default, the files necessary to run AutoPilot Installer are copied to:

c:\Program Files\Emulex\AutoPilot Installer.

When you select the **Create AutoPilot Installer Kits** option, the files are copied by default to an Emulex folder in your Documents folder.

Table 1: AutoPilot Installer Program Files

Folder	Description
AutoPilot Installer	This folder contains files necessary to run the AutoPilot Installer, including: <ul style="list-style-type: none">• APInstall.exe - Executable file for the AutoPilot Installer.• APInstall.cfg - Default configuration file for the AutoPilot Installer.
Drivers\Storport	This folder contains the files necessary to install the drivers.
Utilities	This folder contains files necessary to install the HBAnyware utilities.
reports	AutoPilot Installer reports are placed here by default. Reports can be placed in a different location using the ReportLocation parameter.

AutoPilot Installer Overview

AutoPilot Installer runs after the driver kit is installed. It can be run by:

- Continuing the installation process after the driver kit installation completes.
- Interactive installation at a later time.
- Unattended installation.

AutoPilot Installer Features

- Command line functionality - Initiates an installation from a command prompt or script. Configuration settings can be specified on the command line.
- Compatibility - Verifies that the driver to be installed is compatible with the operating system and platform.
- Driver and utility updates - Installs and updates drivers and utilities.
- Multiple adapter installation capability - Installs drivers on multiple adapters, alleviating the need to manually install the same driver on all adapters in the system.
- Driver diagnostics - Determines whether the driver is operating properly.
- Silent installation mode - Suppresses all screen output (necessary for unattended installation).
- Utility-only installation - AutoPilot Installer can skip driver installation if the driver on the system is the same as the driver AutoPilot Installer is about to install. This functionality is available for attended and unattended installations.
- Management Mode Setup - Parameters in the AutoPilot Installer configuration file or on the command line determine if you can manage adapters locally and remotely, and if the user can change the remote management options once the utility is installed.

Note: See “Software Configuration Parameters” on page 17 in the Unattended Installation topic for more information. Management mode parameters govern both attended and unattended installations.

Text-Only Installation

Text-based installation mode is used automatically when AutoPilot Installer runs on a server with the Server Core installation option of Windows Server 2008. During text-based installations, AutoPilot Installer interacts through a command prompt window. AutoPilot Installer notifies you when the driver is installed and also gives you a chance to abort the installation.

Table 2: Supported Installation Modes

Installation Kit	Full Windows System	Server Core System
Full Driver Kit	GUI Install Silent Install	Not Allowed
Core Driver Kit	GUI Install Silent Install	Text-based Install Silent Install

Whether it is launched from the command line or started programmatically, Windows always starts AutoPilot Installer as a separate stand-alone task. This means that AutoPilot Installer will have its own command prompt window and cannot access others.

Installing the Driver Kit

To install either the full driver kit or the core driver kit:

1. Download the driver kit installer from the Emulex Web site to your system. There is one driver kit installer for the full driver kit and one driver kit installer for the core driver kit. Only one driver kit may be installed on any system. The driver kit installer is an executable file with a name similar to storportminiportkit_2-10a7-1c.exe for the full driver kit, or storportminiportcorekit_2-10a7-1c.exe for the core driver kit.

Note: The name of the driver kit installer depends on the current version identifier.

2. Once you download the driver kit installer, you have several options:
 - For an automatic interactive installation without customization, see “Option 1: Automatically Run AutoPilot Installer” on page 6.
 - For control of all interactive installation settings, see “Option 2: Run AutoPilot Installer Separately” on page 7.
 - To create your own AutoPilot Installer kits and deploy them, see “Option 3: Create an AutoPilot Installer Kit” on page 7.
 - For an unattended installation with AutoPilot Installer, see “Performing an Unattended Installation” on page 13.

Starting Installers from a Command Prompt or Script

When a driver kit installer or AutoPilot Installer is run from a command prompt or command script (batch file), the Windows command processor does not wait for the installer to run to completion. Thus you cannot check the exit code of the installer before the next command is executed. Emulex recommends that command line invocation always use the “start” command with the “/wait” option. This will cause the command processor to wait for the installer to complete before it continues. The preferred method for launching the driver kit Installer from a command prompt or a command script is:

```
start /wait storportminiportkit_2-10a7-1c
```

Running a Software Installation Interactively

There are three options when performing an installation interactively. These options assume you have already downloaded the driver kit installer from the Emulex web site.

Option 1: Automatically Run AutoPilot Installer

Use this option unless you have specific configuration needs. This option allows you to complete a driver kit installation and AutoPilot installation with a few simple mouse clicks.

1. Double-click the driver kit installer or run it from a command line. See “Driver Kit Installer Command Line Parameters” on page 14 for information on the command line options. One command line parameter, APargs, lets you specify arguments that will automatically be passed to the AutoPilot Installer command. A Welcome page is displayed with driver kit version information and Emulex contact information.
2. Click **Next** to proceed to the Installation Options page.

For each installation option, the default installation location for that option is displayed. Browse to a different location, if desired.

- For the core driver kit, there is only one installation option: Perform AutoPilot Installation.
- For the full driver kit, you have an additional option to Create AutoPilot Installer Kits. The default option is Perform AutoPilot Installation only.

3. Click **Install** to continue the installation.

The Progress dialog box is displayed. After all tasks complete, a Finish page is displayed. The Start AutoPilot Installer box is automatically selected.

4. Click **Finish**. AutoPilot Installer is run automatically.

Option 2: Run AutoPilot Installer Separately

This option is recommended to:

- Change installation settings, such as the HBAware management mode, for a limited number of systems.
- Familiarize yourself with AutoPilot Installer configuration options.
- Test a configuration file that you created as part of Option 3 (see below).

To access these features, you run AutoPilot Installer after driver kit installation is done. This allows you to change the configuration options supplied to AutoPilot Installer (see below).

1. Perform steps 1 through 3 for Option 1.
2. Clear the **Run AutoPilot Installer** check box on the Finish page.
3. Click **Finish**. The driver kit installer exits.

After the driver kit installation is finished, change the configuration in one of two ways:

- Change the configuration file. See “Software Configuration Parameters” on page 17 for details.
- Supply parameters on the command line. See “Command Line Parameter Settings” on page 16 for details.

Once you have finished this step, you can run AutoPilot Installer at a later time, using either of the following methods: (If you are supplying options via the command line, you must use the second option.)

- Select **Programs>Emulex>AutoPilot Installer** in the Start menu.
- Run AutoPilot Installer from a command line by running

```
"C:\Program Files\Emulex\AutoPilot Installer\APInstall.exe"
```

Note: The location of APInstall.exe may differ on your system, depending on your system's Program Files location. You may also specify a different location when you install the driver package.

Option 3: Create an AutoPilot Installer Kit

This option is recommended to install the same customized configuration on multiple systems in your SAN.

1. Run the driver kit installer. The Installation options page is displayed.
2. Select the **Create AutoPilot Installer Kits** option.
3. Clear the **Perform AutoPilot Installation** option unless you also want to run AutoPilot Installer using Option 1 or Option 2 as previously described. The Create AutoPilot Installer Kits option will not install any additional programs on your system. Instead, files will be copied to a Documents folder. The files can be used to create AutoPilot Installer Kits. An AutoPilot Installer Kit is a folder containing APInstall.exe and other files. You run this copy of APInstall.exe from the command line.

After the driver kit installer is finished, you'll typically find APInstall.cfg in:

```
Documents\Emulex\AutoPilot Installer Kit version\Installers
```

where *Documents* is your Documents folder (named “My Documents” in Windows Server 2003 or “*username*\Documents” in Windows Server 2008/Vista) and *version* is the driver package version identifier. You can specify a different AutoPilot Installer kits folder when you select the Create AutoPilot Installer Kits option.

See “Configuring an AutoPilot Installer Kit” on page 15 for more information on creating a custom kit.

Hardware-First Installation or Driver and Utility Update

The driver kit installer must be downloaded from the Emulex Web site and installed. Either the full or the core package may be installed; only one can be installed on a system.

Note: To update the Storport Miniport driver, begin the following procedure at step 2.

To perform a hardware-first installation:

1. Install a new Emulex adapter and power-on the system. If the Windows Found New Hardware wizard is displayed, click **Cancel** to exit. AutoPilot Installer performs this function.

Note: If there are multiple adapters in the system, the Windows Found New Hardware wizard appears multiple times. Click **Cancel** to exit the wizard each time it appears.

2. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6.
3. When the AutoPilot Installer Welcome page appears, select an adapter in the list and click **Next**. Installation continues. Specific considerations:
 - If you are replacing a SCSIport Miniport or FC Port driver, an Available Drivers list will be displayed for your review. Click **OK** on this window.
 - If you are updating the driver and the utility, your existing management modes and port settings will be used, unless otherwise specified in the configuration file. These settings will be pre-selected but can be changed. Set or change settings, then click **Next**.
 - If you are **initially** installing a vendor-specific version of the Emulex driver installation program, a Driver Configuration page may be displayed. This page includes one or more windows with questions that you must answer before continuing the installation process. In this case, answer each question and click **Next** on each window to continue.
4. If the Utilities Installation page appears (as seen in Figure 1), select how adapters (local and remote) are managed by the HBAnyware utility.

Note: The display of the Utilities Installation page is optional and based on settings on the AutoPilot Installer command line or in the AutoPilot Configuration file. See “Software Configuration Parameters” on page 17 for more information.

The following configurations can be selected:

- Strictly Local Management - The HBAnyware utility only manages the adapters on this host and no remote management of adapters is allowed.
- Local Management Plus - The HBAnyware utility only manages the adapters on this host. Management of adapters on this host from other hosts is allowed.
- Full Management - The HBAnyware utility manages the adapters on this host and other hosts that allow it. Management of adapters on this host from other hosts is also allowed.
- Read Only Management - If you select this check box, the HBAnyware utility cannot perform configuration tasks, such as changing driver parameter values or updating firmware.
 - This option cannot be checked if Strictly Local Management is selected.

- If Local Management Plus is selected, the HBAnyware utility can view information about the adapters on this host but cannot change the information.
- If Full Management is selected, the HBAnyware utility can view information about the adapters on this host and other hosts that allow it, but cannot change the information.

In both cases, other hosts can view and manage the local host's adapters.

- To prevent the management mode from being changed after installation, clear the **Allow users to change the management mode after installing the utility** check box.

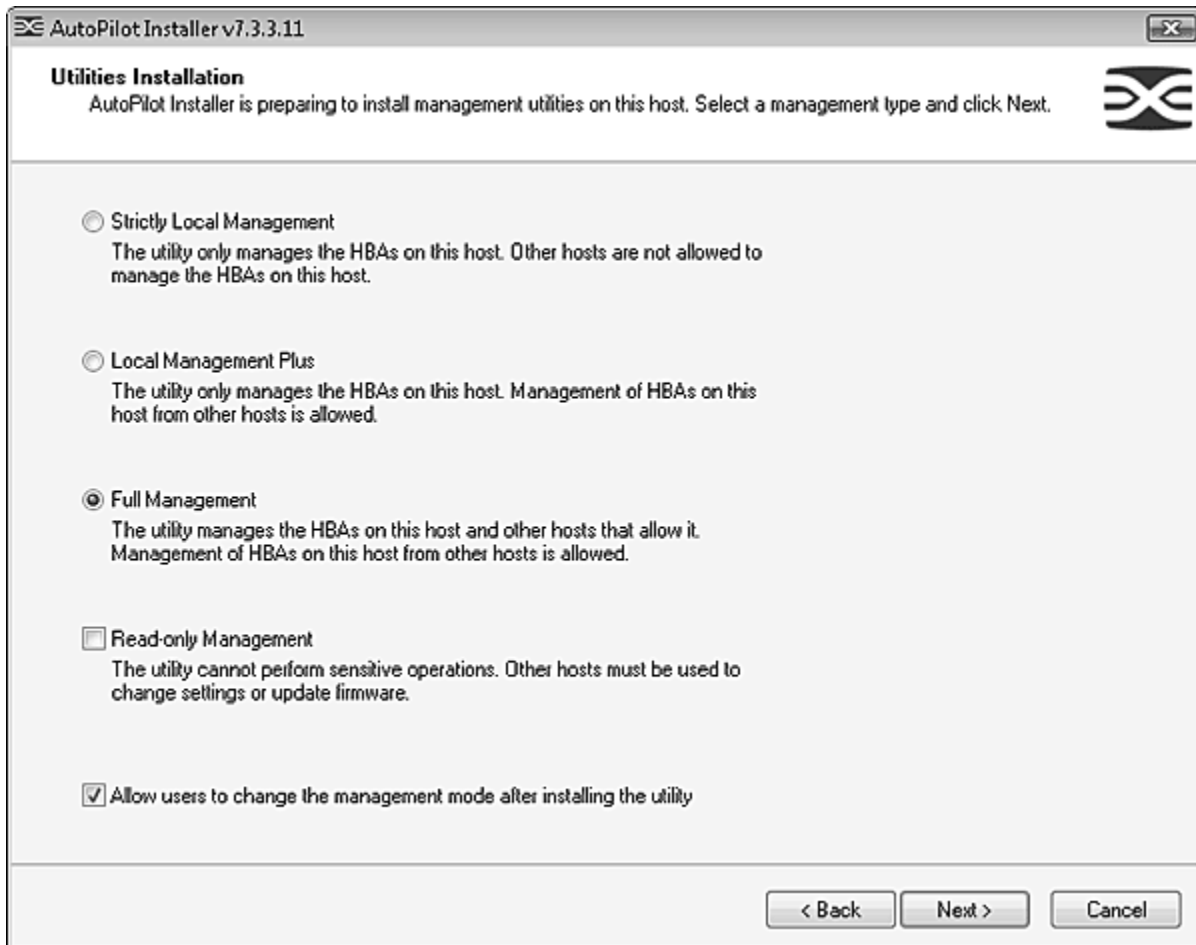


Figure 1: Utilities Installation Management Mode Setup

5. Click **Next**. Installation automatically continues to completion. A dialog box will be displayed if Windows requires a reboot. View the progress of the installation. Once the installation is successful, a Finish page appears.
6. View or print a report, if desired.
 - View Installation Report - The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
 - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
7. Click **Finish** to exit AutoPilot Installer. If your system requires a reboot as indicated in step 5, you must do so before using the drivers or utilities.

Software-First Installation

The driver kit installer must be downloaded from the Emulex Web site and installed on your system. Either the full or core driver package may be installed.

To perform a software-first installation:

1. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6. The following message appears:



Figure 2: AutoPilot Installer Warning (Software-First Installation)

2. Click **OK**. A Welcome page appears.
3. Click **Next**. Installation automatically completes.
View the progress of the installation. Once the installation is successful, a Finish Page appears.
4. View or print a report, if desired.
 - View Installation Report. The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
 - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
5. Click **Finish** to exit AutoPilot Installer.

Utility-Only Update

You can reinstall or update a utility without reinstalling the Storport Miniport driver. This option is only available if the Storport Miniport driver in the driver kit installer is the same version as the driver that is already installed on the system.

For unattended installations, the ForceDriverUpdate setting must be set to false. (See “Software Configuration Parameters” on page 17.)

For attended hardware-first utility updates:

1. Run AutoPilot Installer using any of the options listed in the “Running a Software Installation Interactively” on page 6.

- When the AutoPilot Installer Welcome page appears, click **Next**. The Driver Installation Issue page is displayed.

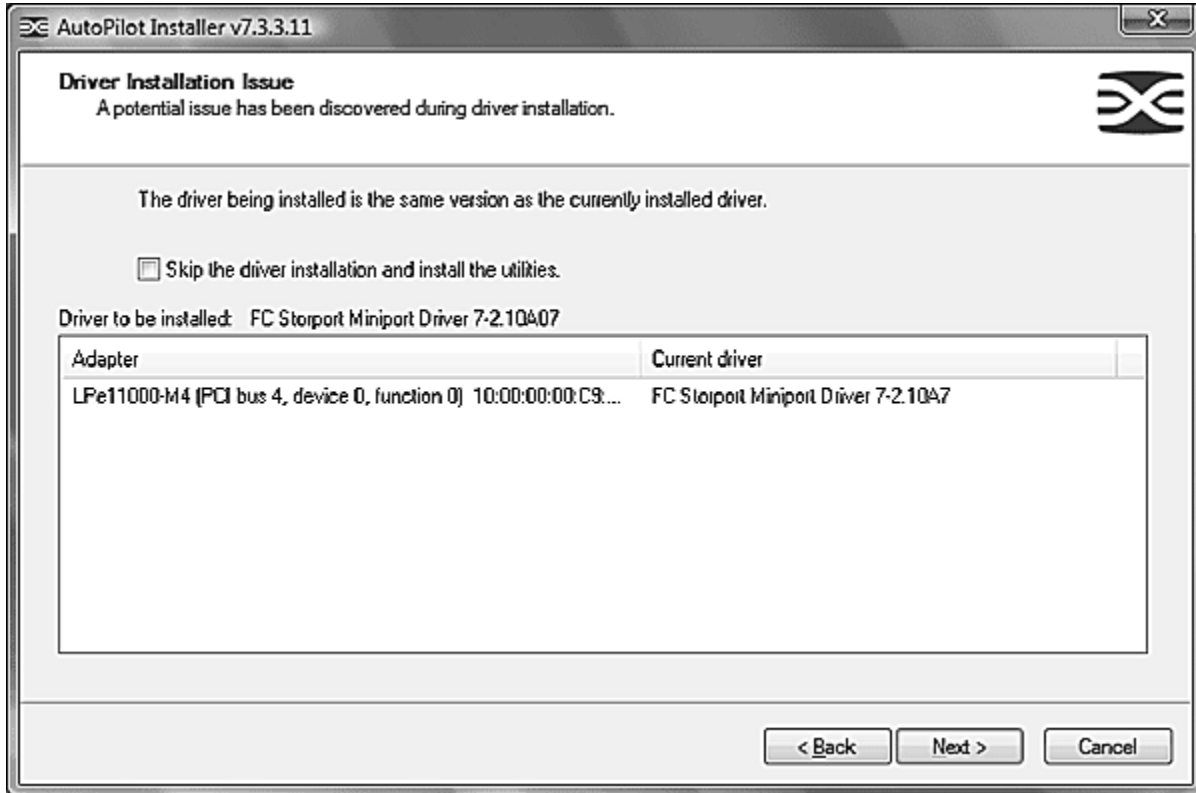


Figure 3: Driver Installation Issue

- Select the **Skip the driver installation and install the utilities** check box and click **Next**. To stop installation, click **Cancel**.
- View or print a report, if desired.
 - View Installation Report. The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
 - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
- Click **Finish** to exit AutoPilot Installer. If the system needs to reboot, you are prompted to do so after you click **Finish**.

For software-first utility updates:

- Run AutoPilot Installer. A dialog appears asking if you want to perform a software-first installation of the drivers and utilities, or just an installation of utilities.
- Select **Utilities Only**. Installation proceeds. View the progress of the utility installation. Once the utility installation is successful, a congratulations window appears.
- View or print a report, if desired (see details in step 4 of the previous procedure)
- Click **Finish** to exit AutoPilot Installer.

Diagnostics

Once the AutoPilot Installer finishes, the Diagnostics window is displayed. Figure 4 shows a successful installation.

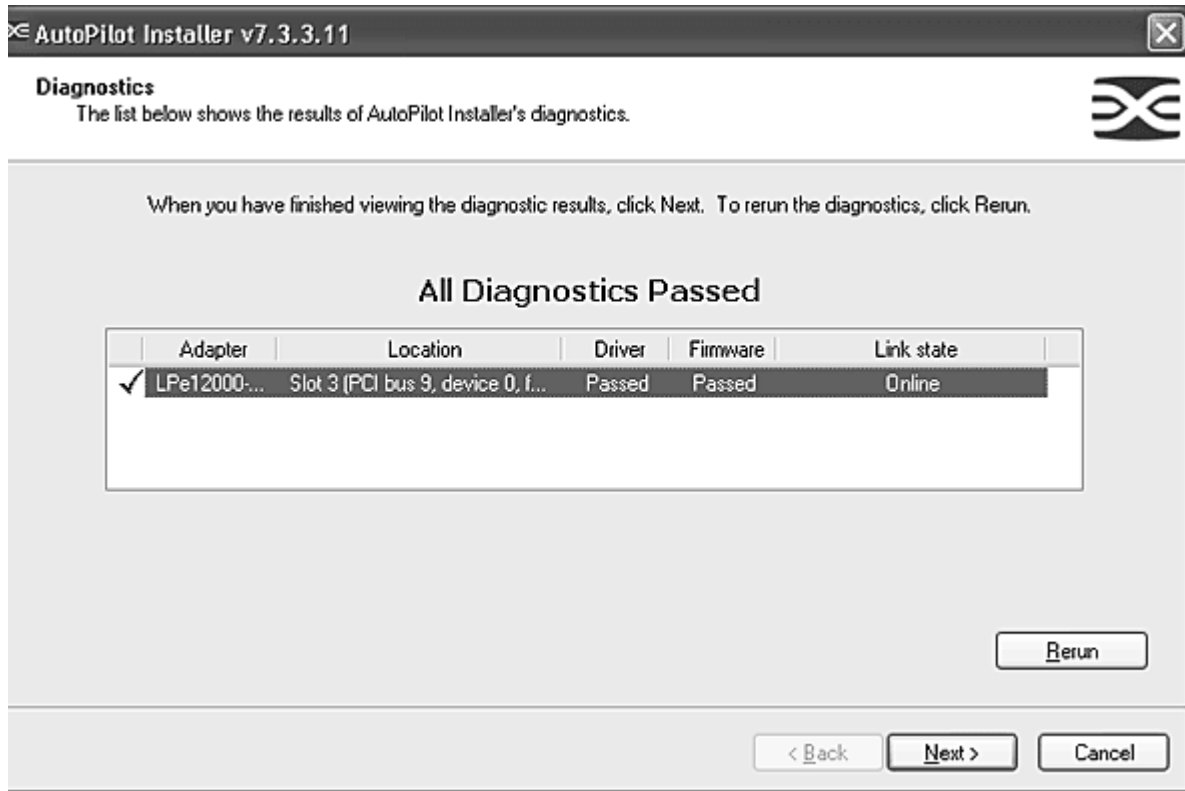


Figure 4: AutoPilot Installer Diagnostics.

Note: AutoPilot Installer can be run again from the Start menu (Programs>Emulex>AutoPilot Installer) or APInstall.exe can be run from a command prompt.

If the installation fails, the Diagnostics window shows that the adapter failed. If the adapter fails:

1. Select the adapter to view the reason an adapter failed. The reason and suggested corrective action are displayed.
2. Perform the suggested corrective action and run AutoPilot Installer again.

Performing an Unattended Installation

An unattended installation, sometimes referred to as a quiet or silent installation, requires no user input. This is useful for performing an installation remotely from a command script, or when you want to make sure a custom configuration will not be changed by a user during installation. There are several ways to perform an unattended installation. These correspond to the options for running the software installation interactively.

Option 1: Automatically Run AutoPilot Installer

Run the driver kit installer from a command prompt or script. Specify the “/q” (quiet) command line option. For example:

```
storportminiportkit_2-10a7-1c.exe /q
```

Note: The name of the driver kit installer depends on whether you are installing the full or core package and the current version identifier. For other command line options, see “Driver Kit Installer Command Line Parameters” on page 14.

Option 2: Run AutoPilot Installer Separately

- Run the driver kit installer, but defer running AutoPilot Installer. Then choose one of the following options:
 - Run AutoPilot Installer from a command prompt or script with the silent option:
`APInstall.exe /silent`
 - Edit the AutoPilot Installer configuration file before running AutoPilot Installer. The configuration file is typically in:
`C:\Program Files\Emulex\AutoPilot Installer\APInstall.cfg`

Uncomment the line that sets `SilentInstallEnable` to “True”. There are other settings in the same section of the configuration file related to unattended installations that you may also want to edit. See “Software Configuration Parameters” on page 17 for more information. After editing the file, you can run AutoPilot Installer from the Start menu, a command prompt or a script.

Option 3: Create an AutoPilot Installer Kit

- Run the full driver package installer and choose the **Create AutoPilot Installer Kits** option. Then do one of the following:
 - Create AutoPilot Installer kits using the `makekit.cmd` script (makekit script), as described in the “Configuring an AutoPilot Installer Kit” on page 15. Run `APInstall.exe` in the kit folder you create, specifying the “/silent” switch.
 - For customized settings, edit the AutoPilot Installer configuration file as previously described, except edit the file
`Documents\Emulex\AutoPilot Installer Kit version\Installers\APInstall.cfg`
instead of the one in Program Files. Create AutoPilot Installer kits using the makekit script, as described in “Configuring an AutoPilot Installer Kit” on page 15. Run `APInstall.exe` in the kit folder you create.

See “Starting Installers from a Command Prompt or Script” on page 6 for important information on running the installer from a command prompt or script.

When in unattended installation mode, AutoPilot Installer does the following:

1. Reads the configuration file.
2. Reads any options that may be specified on the command line, overriding the configuration file settings as appropriate.
3. Opens the installation report file.
4. Validates the operating system.
5. Discovers adapters and records the adapter inventory in the report file.
6. Verifies mandatory configuration file parameters.
7. Searches for drivers to be installed based on the LocalDriverLocation setting in the configuration file.
8. If appropriate, verifies that the selected driver is a different type than the currently installed driver, or more recent version of the currently installed driver.
9. Copies the driver parameters from the configuration file into the registry for the driver's coinstaller.
10. Installs/updates the driver.
11. Rediscovered adapters and records the updated adapter inventory in the report file.
12. Records the final results and closes the report file.

Driver Kit Installer Command Line Parameters

You can pass command line parameters to AutoPilot Installer, yet still have it run automatically by the driver kit, if you run the driver kit installer from a command prompt or script.

If you specify the “/q” switch with the driver installer command, the driver installer will run in unattended mode and it will automatically invoke APInstall.exe with its “/silent” switch. See the “Performing an Unattended Installation” on page 13 for more information.

If you specify a value for the “APargs” driver kit parameter, this value will be appended to the APInstall.exe command line. See “Command Line Parameter Settings” on page 16 for more information on the AutoPilot Installer settings that may be specified in the APargs value.

For example, assume the driver kit file you downloaded from the Emulex web site is named storportminiportkit_2-10a7-1c.exe. If you execute this installer file as:

```
storportminiportkit_2-10a7-1c.exe /q APargs=ManagementMode=Full
```

then after installing AutoPilot Installer, the driver kit will automatically execute it as:

```
APInstall.exe /silent ManagementMode=Full
```

To specify more than one AutoPilot Installer parameter, separate the settings by one or more spaces and put quotes around the entire APargs expression. For example, the command line (all on one line)

```
storportminiportkit_2-10a7-1c.exe "APargs=ManagementMode=ReadOnly  
ManagementModeChangeable=FALSE"
```

results in AutoPilot Installer being run as:

```
APInstall.exe ManagementMode=ReadOnly ManagementModeChangeable=FALSE
```

AutoPilot Installer parameter values that contain spaces, such as path names, must be enclosed in quotes. To add such a setting to APargs, you must insert backslashes before the quotes around the value, and then add quotes around the entire APargs expression. For example, the command line (all on one line)

```
storportminiportkit_2-10a7-1c.exe "APargs=ReportLocation=\"C:\Documents and Settings\Administrator\My Documents\reports\""
```

results in AutoPilot Installer being run as:

```
APInstall.exe ReportLocation="C:\Documents and Settings\Administrator\My Documents\reports"
```

If you have many parameters to pass to AutoPilot Installer, or if you want to do so repeatedly, then it may be less error prone to run the driver kit installer interactively, delay AutoPilot Installer execution, and then run the AutoPilot Installer command yourself. The procedure for doing so is described in the “Option 2: Run AutoPilot Installer Separately” on page 7 and “Performing an Unattended Installation” on page 13.

Configuring an AutoPilot Installer Kit

To configure an AutoPilot Installer kit:

1. Create an AutoPilot Installer Kits folder by using the Create AutoPilot Installer Kits option of the full driver kit. See “Option 3: Create an AutoPilot Installer Kit” on page 13. By default, the driver kit will create a folder named
`Documents\Emulex\AutoPilot Installer Kit version\Installers`
where *Documents* is your Documents folder (named “My Documents” in Windows Server 2003) and *version* is the driver package version identifier. However, you may specify a different location for the folder.
2. Open a command prompt window and `cd` to the folder created by the driver kit.
3. If desired, customize the `APInstall.cfg` file. It is located in the `Installers` folder within the folder created by the driver kit. See “AutoPilot Configuration File” on page 20 for more information.
4. Decide whether you want AutoPilot Installer to install the full utilities kit (including the HBAware GUI and CLI) or just the core utilities kit (no GUI).

Note: The GUI cannot be installed on Server Core systems.

5. Decide which CPU architectures on which you'll install the kits: x86, x64, or IA64.
6. Run the `makekit` command script in the folder created by the driver kit:

```
makekit
```

The `makekit` script will prompt you for the CPU architecture and utilities set.

If you prefer, you may run `makekit` non-interactively, from a command prompt or a command script. To see all the `makekit` options, type:

```
makekit ?
```

For example, to create a kit folder for x86 machines that installs the full utility set, you can type:

```
makekit x86 full
```

Unless you specify a different path on the `makekit` command, `makekit` will create a folder in the current folder by concatenating the architecture and utilities options chosen. For example:

```
x86_full_kit
```

Note: Since `makekit` is a command script, you must precede it with the Windows **call** command to call it from another command script. Otherwise, the parent script will not continue after the `makekit` script exits. For example:

```
REM Create kit for Windows Server 2008 x64 Core installations.
call makekit x64 core \\server\share\Emulex_x64_core_kit
if errorlevel 1 echo Creation of Emulex_x64_core_kit failed
```

AutoPilot Installer Command Line Parameters

The syntax used to run AutoPilot Installer silently from a command line or script is:

```
APIInstall [/silent] [parameter setting] [parameter setting...]
```

The “silent” switch and parameter settings can occur in any order. One or more spaces must separate the switch and each parameter setting.

Command Line Parameter Settings

The syntax of a parameter setting is

```
parameter_name = ["]value["]
```

Double quotes are required only around values that contain spaces. Spaces may separate parameters, equal signs and values. Parameter names and values are not case-sensitive.

The APIInstall command may contain the settings listed below. Each setting, except ConfigFileLocation, may also be specified in the AutoPilot Configuration file. For descriptions of each parameter, see “Software Configuration Parameters” on page 17.

Settings specified in the APIInstall command override those specified in the configuration file.

```
ConfigFileLocation = path-specifier
NoSoftwareFirstInstalls = { TRUE | FALSE }
SilentRebootEnable = { TRUE | FALSE }
ForceDriverUpdate = { TRUE | FALSE }
ForceDriverTypeChange = { TRUE | FALSE }
SkipUtilityInstall = { TRUE | FALSE }
SkipDriverInstall = { TRUE | FALSE }
InstallWithoutQFE = { TRUE | FALSE }
ForceRegUpdate = { TRUE | FALSE }
LocalDriverLocation = path-specifier
UtilitiesLocation = path-specifier
ReportLocation = path-specifier
ManagementMode = { LocalOnly | LocalPlus | LocalReadOnlyPlus | ReadOnly | Full }
HideManagementModeGUI = { TRUE | FALSE }
ManagementModeChangeable = { TRUE | FALSE }
```

Path Specifiers

Paths may be specified as

- an explicit path:

```
ReportLocation="C:\Program Files\Emulex\AutoPilot Installer\Reports"
```

Note: The double quotes are required for values that contain spaces, such as the value above.

- a relative path:

```
LocalDriverLocation="Drivers\Storport Miniport\"
```

(assuming installation into “C:\Program Files\Emulex\AutoPilot Installer\”, this path would logically become “C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport Miniport\”)

- with the %ProgramFiles% environment variable:

```
UtilitiesLocation = "%ProgramFiles%\Emulex\AutoPilot Installer\Utilities"
```

Configuration File Location

The optional setting ConfigFileLocation contains the path to the configuration file that should be used. If this parameter is not specified, AutoPilot Installer will use the file named APInstall.cfg in the same folder as APInstall.exe.

The format is the same as that of the other path settings.

Example

```
APInstall /silent SkipDriverInstall=True ManagementModeChangeable="True"  
configFileLocation=MyConfiguration.cfg
```

Software Configuration Parameters

DiagEnable (Running Diagnostics)

Note: The DiagEnable parameter cannot be specified on the command line.

Default: True

By default, AutoPilot Installer will run its diagnostics after all driver installation tasks have been completed. To disable this function, set this parameter to false.

ForceDriverTypeChange (Forcing a Driver Type Change)

Default: False

When installing a driver, set this parameter to true to cause silent mode installations to update/install the Storport Miniport driver on each adapter in the system, without regard for the currently installed driver type (replacing any installation of the SCSIport Miniport or FC Port driver).

ForceDriverUpdate (Forcing a Driver Version Update)

Default: False

By default, if the same version of the driver is already installed, an unattended installation will proceed with installing only the utilities. To force a driver update even if the same version of the driver is installed, set this parameter to true.

Note: ForceDriverUpdate applies to unattended installations only; in interactive installations this parameter is ignored. Instead you are asked if the driver should be updated.

ForceRegUpdate (Forcing Updates of an Existing Driver Parameter Value)

Default: False

The ForceRegUpdate driver parameter setting determines if existing driver parameters are retained or changed when you update the driver. By default, all existing driver parameter settings are retained. The ForceRegUpdate parameter does not affect any existing persistent bindings. To set up an installation to remove the existing driver parameters from the registry and replace them with parameters specified in the AutoPilot Configuration file, set this parameter to true.

Note: You can also use this setting for attended installations with the AutoPilot Installer wizard if you modify the AutoPilot Configuration file in an AutoPilot Installer Kit.

SkipUtilityInstall (Installing Driver Without Utilities)

Default: False

You can set up an unattended installation to install the driver without installing the utilities package. By default, the utilities are automatically installed with an unattended installation. To set up an installation without utilities, set this parameter to true.

LocalDriverLocation (Specifying Location to Search for Drivers)

Default: Drivers (The default "Drivers" folder is located in the same folder as AutoPilot Installer.)

You can specify a local location that is to be searched for drivers during unattended installations. The location may be a local hard drive or a network share. Removable media are not searched. Example:

```
localDriverLocation = "d:\drivers\new\Storport"
```

Note: On x64 and 32-bit systems, the path specified by 'LocalDriverLocation' must contain at least one instance of both an ElxCna (for CNAs) and ElxStor (for HBAs and CNAs) driver. AutoPilot Installer will automatically select the most recent revisions that it finds.

For IA64 systems, only ElxStor drivers are supported.

NoSoftwareFirstInstalls (Prohibiting Software First Installations)

Default: False

When this parameter is set to true, AutoPilot Installer prevents unattended installations from performing software-first installations. This way, you can execute an automated installation on multiple machines in your network, but only machines with Emulex adapters will actually have Emulex drivers updated or installed.

ManagementMode (Managing Emulex Adapters)

Default: LocalPlus

This parameter controls how the HBAnyware utility manages local and remote adapters. The ManagementMode parameter works with the ManagementModeChangable and HideManagementModeGUI parameters.

- LocalOnly - The utility only manages the adapter on this host and no remote management of adapters is allowed.
- LocalPlus - The utility only manages the adapters on this host. Management of adapters on this host from other hosts is allowed.
- Full - The utility manages the adapters on this host and other hosts that allow it. Management of adapters on this host from other hosts is also allowed.
- LocalReadOnlyPlus - The utility has read-only access to the adapters on this host. Remote hosts must be used to fully manage the adapters on this host.
- ReadOnlyPlus - The utility has read-only access to the adapters on this host and other hosts that allow it. Remote hosts must be used to fully manage adapters on this host.

To set this parameter, set the parameter value to one of the names listed above.

Example: `ManagementMode = "LocalOnly"`

Note: If this setting is not specified and a utility upgrade is being performed, the existing value of this setting will be retained.

ManagementModeChangable (Changing Management Mode)

Default: True

By default, you can change the management mode after the HBAware utility is installed, by selecting the **Management Mode** parameter in the HBAware utility's **File** menu. If the ManagementMode parameter is disabled and the ManagementModeChangable parameter is set to false, you must reinstall the HBAware utility to change the management mode.

Note: If this setting is not specified in the configuration file and a utility upgrade is being performed, the existing value of this setting will be retained.

HideManagementModeGUI (Hiding the Management Mode Configuration)

Default: True

The Utilities Installation page can be displayed by AutoPilot Installer. (See Figure 1 on page 9.) The page is displayed only if this parameter is set to false. AutoPilot Installer then reads the configuration file parameters and uses those settings to pre-select the appropriate options in the page.

If this parameter is omitted from the configuration file or explicitly set to true, the page is not displayed. AutoPilot Installer will use configuration file parameters to determine the appropriate management mode.

ManagementPort (Specifying the Port Number)

Note: The ManagementPort parameter cannot be specified on the command line.

Default: 23333 (assigned to Emulex by the Internet Assigned Numbers Authority [IANA])

A numeric value indicating the port number at which Emulex utilities should operate. If changed, this setting must be propagated throughout any other machines on the SAN.

ReportLocation (Setting Up an Installation Report Title and Location)

The automatically generated file name for reports is

`"report_ mm-dd-yy.txt"`

where 'mm' is the month *number*, 'dd' is the day, and 'yy' indicates the year.

You can only change the installation report folder; the file name is auto-generated. In the following example x could be any available drive:

`ReportLocation = "x:\autopilot\reports\installs\"`

SilentInstallEnable (Enabling Unattended Installation)

Note: Setting the SilentInstallEnable parameter to true in the configuration file is functionally equivalent to supplying the "/silent" switch on the command-line. You cannot specify the SilentInstallEnable parameter on the command line.

Default: False

Setting this parameter to true causes AutoPilot Installer to operate with no user interaction.

SilentRebootEnable (Enabling Silent Reboot)

Default: False

If Windows must be restarted after a driver is installed, AutoPilot Installer's default behavior in unattended installations is not to restart the system. AutoPilot Installer continues with the installation and you must restart at a later time. Restarts often require you to login as part of the Windows start up process and without logging in, the installation process would hang if it restarted the system. However, Windows can be configured to start up without requiring you to login. You must make sure it is safe to restart the system during unattended installations if you are going to set this parameter to true.

InstallWithoutQFE (Enabling Installation if a QFE Check Fails)

Default: False

AutoPilot Installer checks for Microsoft's Quick Fix Engineering updates (QFEs), also known as KB (Knowledge Base) updates, based upon the checks you have specified in the [STORPORT.QFES] section. By default, the installation will terminate if the QFE check should fail. To enable a driver installation to proceed even if a check for QFEs should fail, set this parameter to true.

AutoPilot Configuration File

The AutoPilot Configuration file is organized into sections, grouped according to related commands. There are six main sections. Each section begins with a heading. The heading is required even if there are no settings in the section. The only section not required is the Installation Prompts section, which has the heading [STORPORT.CONFIGURATION]. That section cannot exist if AutoPilot Installer will be run in silent mode. You must delete or comment-out that entire section for unattended installation. The sections and their headings are:

- Configuration Identification [AUTOPILOT.ID] - This section appears at the beginning of every AutoPilot Configuration file. This section contains revision and label information. The revision entry identifies the file's version number and the date on which it was produced. The label entry is used to identify the configuration that the file supports. This section can appear only once in the AutoPilot Configuration file.
- Software Configuration [AUTOPILOT.CONFIG] - This section can contain settings that control and configure AutoPilot Installer and the HBAnyware utility operation. This section can appear only once in the AutoPilot Configuration file.
- Installation Prompts [STORPORT.CONFIGURATION] - This section can contain questions that must be answered during the initial installation process. This section applies to attended installations only, this section must not be present in configuration files to be used with unattended installations.
- Driver Parameters [STORPORT.PARAMS] - This section can specify driver parameters. Parameters are read exactly as they are entered and are written to the registry.
- System Parameters [SYSTEM.PARAMS] - This section can adjust the operating system's global disk timeout. The timeout is stored in the registry under the key HKML\CurrentControlSet\Services\disk and specified with the following string: TimeOutValue = 0x3C (where the number is the timeout value in seconds.)
- Additional Quick Fix Engineering (QFE) Checks [STORPORT.QFES] - This section can specify additional QFE check, also known as KB (Knowledge Base) updates, during installation. This section can appear anywhere within the file as long as it is not contained within another section.

Lines that begin with a semicolon are comments. Some of the comments are sample settings. To use the setting, remove the semicolon.

Using the Windows Environment Variable (%ProgramFiles%)

You can use the Windows ProgramFiles environment variable in the LocalDriverLocation, UtilitiesLocation and ReportLocation strings within the configuration file. This allows you to specify strings in a driver independent manner, allowing the same configuration file to be used on different systems where Windows may have been installed on different drives. To use this option, "%ProgramFiles%" must be the first component specified in the string. The portion of the string that follows will be appended to the contents of the ProgramFiles environment variable.

Note: The contents of the ProgramFiles environment variable is not terminated with a slash, so one must be provided in the string. Windows environment variables are not case-sensitive.

```
UtilitiesLocation = "%ProgramFiles%\my company\our utilities"
```

Configuration Identification [AUTOPILOT.ID]

This section contains revision and label information. The revision entry identifies the file's version number and the date on which it was produced. The label entry is used to identify the configuration that the file supports. This section may appear only once in the APInstall.cfg file.

Software Configuration [AUTOPILOT.CONFIG]

The settings in this section affect the operation of AutoPilot Installer during installation. They also affect the operation of the HBAnyware utilities after they are installed. See "Software Configuration Parameters" on page 17 for information about settings that may be specified in this section.

Configuration Prompts/Vendor-Specific Questions [STORPORT.CONFIGURATION]

Note: You must remove or comment out the entire [STORPORT.CONFIGURATION] section for an unattended installation.

A [STORPORT.CONFIGURATION] section may exist in the AutoPilot Configuration file. The first items in this section are the driver parameters to be used regardless of how the questions are answered. This is followed by a subsection that contains questions (these may be vendor-specific questions). A line containing '[QUESTIONS]' marks the start of the subsection, and the end of it is marked by a line containing '[ENDQUESTIONS]'. Within the question subsection there can be as many questions as needed. Each question uses the format:

```
question= "question?", "explanation", "answer0", "answer1", "answer2",.... ,  
"answern"
```

Where:

"question?" contains the text of the question to be asked.

"explanation" contains brief text to help explain the question. The explanation will appear below the question in a smaller font. If there is no explanatory text, empty quotes must be used in its place.

"answer0" contains the 1st answer to be displayed in the drop down list.

"answer1" contains the 2nd answer to be displayed in the drop down list.

"answern" contains the *n*th answer to be displayed in the drop down list.

For each question there can be as many answers as needed. For each answer there must be a corresponding "answer =" section with its corresponding driver parameters listed beneath it. The answer uses the format:

```
answer = 0
    DriverParameter="Param1=value; Param2=value;"
answer = 1
    DriverParameter="Param1=value; Param2=value;"
....
answer = n
    DriverParameter="Param1=value; Param2=value;"
```

Example of [STORPORT.CONFIGURATION] section:

```
[STORPORT.CONFIGURATION]
```

```
    ;The first section contains the driver parameters common to all
    configurations, no matter what answers are given.
```

```
    DriverParameter="EmulexOption=0;"
```

```
[QUESTIONS]
```

```
    question = "What is your link speed?", "Note: select 'Auto-detect' if you
are unsure about the answer.", "4GB", "2GB", "1GB", "Auto-detect"
```

```
        ANSWER = 0
```

```
            DriverParameter = "LinkSpeed=4;"    ;4 GB
```

```
        ANSWER = 1
```

```
            DriverParameter = "LinkSpeed=2;"    ;2 GB
```

```
        ANSWER = 2
```

```
            DriverParameter = "LinkSpeed=1;"    ;1 GB
```

```
        ANSWER = 3
```

```
            DriverParameter = "LinkSpeed=0;"    ;Auto-detect
```

```
    question = "Describe the topology of your storage network.", "Note:
Select 'Arbitrated Loop' when directly connected to the array (no fibre
switch). Select 'Point-to-Point' when connected to a SAN (fibre switch).",
"Arbitrated Loop", "Point-to-Point"
```

```
        ANSWER = 0
```

```
            DriverParameter = "Topology=2;"
```

```
        ANSWER = 1
```

```
            DriverParameter = "Topology=3;"
```

```
[ENDQUESTIONS]
```

```
[END.STORPORT.CONFIGURATION]
```

QFE Checks [STORPORT.QFES]

To add a Windows Quick-Fix Engineering (QFE) check to the configuration file, edit the [STORPORT.QFES] section in the AutoPilot Configuration file. You may place this section anywhere within the file as long as it is not contained within another section. This section contains a single line for each QFE that is to be checked. Up to 10 lines will be checked, more than that may exist but they will be ignored. All parameters in each line must be specified. These lines have the format

```
qfe = "qfe name", "path and file name", "file version", "applicable OS"
```

qfe name - The name of the item being checked. For example, QFE 838896. The name should facilitate searching Microsoft's Web site for any required code updates.

path and file name - This string identifies the file to be checked and its location relative to the Windows home folder. In most cases, the file to check will be the Microsoft Storport driver, for example, "\system32\drivers\storport.sys". This string is also used in dialogs and log file messages.

file version - This is the minimum version that the file to be checked must have for the QFE to be considered installed. It is specified as a text string using the same format as is used when displaying the files property sheet. For example, "5.2.1390.176".

applicable OS - This is used to determine if the QFE applies to the operating system platform present. The acceptable values are "Win2003", "Win2008" and "WinVista".

Example

```
[STORPORT.QFES]
```

```
qfe = "QFE 83896", "\system32\drivers\storport.sys", "5.2.1390.176", "Win2003"
```

Setting Up Driver Parameters [STORPORT.PARAMS]

To change driver parameters, modify this section of the AutoPilot Configuration file. Locate the [STORPORT.PARAMS] section in the AutoPilot Configuration file. This section follows Optional Configuration File Changes. Under the [STORPORT.PARAMS] heading, list the driver parameters and new values for the driver to use.

For example:

```
Driver Parameter = "LinkTimeout = 45"
```

See the HBAware Utility User Manual for a listing of driver parameters, defaults and valid values.

Setting Up System Parameters [SYSTEM.PARAMS]

To change the system parameters, create a [SYSTEM.PARAMS] section in the APInstall.cfg file. Create this section in the Optional Configuration File Changes heading in the [AUTOPILOT.CONFIG] section of the AutoPilot Configuration file.

AutoPilot Installer Exit Codes

AutoPilot Installer sets an exit code to indicate whether an installation was successful or an error occurred. These exit codes allow AutoPilot Installer to be used in scripts with error handling. In unattended installations, AutoPilot Installer sets the following exit codes:

Table 3: Unattended Installation Error Codes

Error Code	Hex	Description
0	0x00000000	No errors
2399141889	0x8F000001	Unsupported operating system detected.
2399141890	0x8F000002	The AutoPilot Configuration file is not found.
2399141891	0x8F000003	Disabled adapters detected in the system.
2399141892	0x8F000004	The selected driver is 64-bit and this system is 32-bit.
2399141893	0x8F000005	The selected driver is 32-bit and this system is 64-bit.
2399141894	0x8F000006	Installation activity is pending. AutoPilot Installer cannot run until it is resolved.
2399141895	0x8F000007	(GUI Mode only) User cancelled execution because user did not wish to perform a software-first install.
2399141896	0x8F000008	No drivers found.
2399141897	0x8F000009	One or more adapters failed diagnostics.
2399141904	0x8F000010	(GUI Mode only) User chose to install drivers even though a recommended QFE or Service Pack was not installed.
2399141920	0x8F000020	(GUI Mode only) User chose to stop installation because a recommended QFE or Service Pack was not installed.
2399141899	0x8F00000B	Unattended installation did not find any drivers of the type specified in the config file.
2399141900	0x8F00000C	A silent reboot was attempted, but according to the operating system a reboot is not possible.
2399141901	0x8F00000D	(GUI Mode only) A driver package download was cancelled.
2399141902	0x8F00000E	(Non-Enterprise) No adapters were found in the system.
2399141903	0x8F00000F	A required QFE or Service Pack was not detected on the system.
2399141836	0x8F000030	AutoPilot Installer was not invoked from an account with Administrator-level privileges.
2391419952	0x8F000040	AutoPilot Installer has detected unsupported adapters on the system.
2399141968	0x8F000050	Unattended software-first installations are disallowed.
2399141984	0x8F000060	User cancelled APInstall before any driver/utility installation occurred.
2399142000	0x8F000070	User cancelled APInstall after driver/utility installation occurred.
2399142016	0x8F000080	An attempt to install a full apps kit on a Server Core system was detected.
2399142032	0x8F000090	APInstaller encountered an error while parsing the command line (Report file contains details).
2399142048	0x8F0000A0	Converged Network Adapters (CNAs) are installed, but are not supported on IA64 systems.

AutoPilot Installer Installation Reports

During each installation, AutoPilot Installer produces a report describing events that occurred during the installation. This report has several sections.

The first section provides basic information including the time and date of the installation, the name of the machine that the installation was performed on, the version number of AutoPilot Installer, and the identification of the configuration file that was used.

The second section provides an inventory of the Emulex adapters as they were before AutoPilot Installer performed any actions.

The third section lists the tasks that AutoPilot will perform in the order they will be done.

The fourth section records the results of each task. When all driver installation tasks are completed, an updated adapter inventory is recorded.

Note: If you cancel AutoPilot Installer, that information is recorded along with when you cancelled the installation. The contents of any error dialogs that are displayed are also recorded.

Command Script Example

Modifying the configuration file enables you to script the installation of a system's driver. The following example command script (batch file) assumes that you have made mandatory changes to the AutoPilot Configuration file, as well as any desired optional changes.

If your systems were set up with a service that supports remote execution, then you can create a command script to remotely update drivers for all of the systems on the storage net. If Microsoft's RCMD service was installed, for example, a script similar to the following would run remote execution:

```
rcmd \\server1 g:\autopilot\x86_full_kit\apinstall
if errorlevel 1 goto serverlok
echo AutoPilot reported an error upgrading Server 1.
if not errorlevel 2147483650 goto unsupported
    echo Configuration file missing.
goto serverlok
:unsupported
if not errorlevel 2147483649 goto older
echo Unsupported operating system detected.
:older
if not errorlevel 2001 goto none
    echo The driver found is the same or older than the existing driver.
    goto serverlok
:none
if not errorlevel 1248 goto noreport
    echo No Emulex adapter found.
goto serverlok
:noreport
    if not errorlevel 110 goto nocfg
        echo Could not open installation report file.
    goto serverlok
:nocfg
    if not errorlevel 87 goto badcfg
```

```
    echo Invalid configuration file parameters.
    goto serverlok
:badcfg
    if not errorlevel 2 goto serverlok
    echo No appropriate driver found.
serverlok
rcmd \\server2 g:\autopilot\ApInstall
ConfigFileLocation=g:\autopilot\mysetup\apinstall.cfg
if errorlevel 1 goto server2ok
echo AutoPilot reported an error upgrading Server 2.
if not errorlevel 2147483650 goto unsupported
    echo Configuration file missing.
goto server2ok
:unsupported
if not errorlevel 2147483649 goto older
    echo Unsupported operating system detected.
:older2
if not errorlevel 2001 goto none2
    echo The driver found is the same or older than the existing driver.
    goto server2ok
:none2
if not errorlevel 1248 goto noreport2
    echo No adapter found.
goto server2ok
:noreport
if not errorlevel 110 goto nocfg2
    echo Could not open installation report file.
goto server2ok
:nocfg2
if not errorlevel 87 goto badcfg2
    echo Invalid configuration file parameters.
    goto server2ok
:badcfg2
    if not errorlevel 2 goto server2ok
    echo No appropriate driver found.
server2ok
```

Manual Installation and Updating Procedures

Manually Installing or Updating the Storport Miniport Driver

Overview

You can install or update the Storport Miniport driver and utilities manually without using AutoPilot Installer.

The Emulex PLUS (ElxPlus) driver supports the HBAnyware utility, persistent binding and LUN mapping and masking. The ElxPlus driver must be installed before you install the Storport Miniport driver.

Removing the Adjunct Driver Registry Key

The ElxPlus driver replaces the adjunct driver that was used with Storport Miniport 1.11a3 or earlier. If currently installed, the adjunct driver registry key must be removed using the deladjct.reg file before you install the ElxPlus driver. The deladjct.reg file was extracted when you installed the old driver.

Manually Installing the Emulex PLUS (ElxPlus) Driver for the First Time

To install the ElxPlus driver from the desktop:

Note: Only one instance of the Emulex PLUS driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 6 for instructions on how to do this.
2. Select **Start>Control Panel>Add Hardware**. The Add Hardware Wizard window appears. Click **Next**.
3. Select **Yes, I have already connected the hardware** and click **Next**.
4. Select, **Add a new hardware device** and click **Next**.
5. Select **Install the hardware that I manually select from a list (Advanced)** and click **Next**.
6. Select **Show All Devices** and click **Next**.
7. Click **Have Disk...** Direct the Device Wizard to the location of elxplus.inf. If you have installed the driver installer kit in the default folder and C:\ is your Windows system drive, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver version
 - or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver version
 - or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
8. Click **OK**.
9. Select **Emulex PLUS**. Click **Next** and click **Next** again to install the driver.
10. Click **Finish**. The initial ElxPlus driver installation is complete. Continue with manual installation of the Storport Miniport Driver. See page 28 for this procedure.

Manually Updating the Emulex PLUS (ElxPlus) Driver

To update an existing ElxPlus driver from the desktop:

Note: Only one instance of the Emulex PLUS driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 6 for instructions on how to do this.
2. Select **Start>Administrative Tools>Computer Management**.
3. Click **Device Manager** (left pane).
4. Click the plus sign (+) next to the Emulex PLUS class (right pane) to show the ElxPlus driver entry.
5. Right-click the ElxPlus driver entry and select **Update Driver...** from the menu.
6. Select **No, not this time**. Click **Next** on the **Welcome to the Hardware Update Wizard** window. Click **Next**.
7. Select **Install from a list or specific location (Advanced)** and click **Next**.
8. Select **Don't Search. I will choose the driver to install**.
9. Click **Have Disk...** Direct the Device Wizard to the location of driver's distribution kit. If you have installed the driver installer kit in the default folder, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version
or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64 driver version
or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium driver version
10. Click **OK**. Select **Emulex PLUS**.
11. Click **Next** to install the driver.
12. Click **Finish**. The ElxPlus driver update is complete. Continue with manual installation of the Storport Miniport Driver.

Manually Installing or Updating the Fibre Channel Storport Miniport Driver

To update or install the Storport Miniport driver from the desktop:

1. Select **Start>Control Panel>System**.
2. Select the **Hardware** tab.
3. Click **Device Manager**.
4. Open the “SCSI and RAID Controllers” item.
5. Double-click the desired Emulex adapter.

Note: The driver will affect only the selected adapter. If there are other adapters in the system, you must repeat this process for each adapter. All DC adapter models will be displayed in Device Manager as two adapters, therefore each adapter must be updated.

6. Select the **Driver** tab.
7. Click **Update Driver**. The Update Driver wizard starts.
8. Select **No, not this time**. Click **Next** on the **Welcome to the Hardware Update Wizard** window.

9. Select **Install from a list or specific location (Advanced)** and click **Next**.
10. Select **Don't search. I will choose the driver to install** and click **Next**.

Note: Using the OEMSETUP.INF file to update Emulex's Storport Miniport driver overwrites customized driver settings. If you are upgrading from a previous installation, write down the settings. Following installation, use the HBAnyware utility to restore the pre-upgrade settings.

11. Click **Have Disk....** Direct the Device Wizard to the location of oemsetup.inf. If you have installed the driver installer kit to the default folder, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver versionor
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver versionor
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
12. Click **OK**. Select **Emulex LightPulse LPX000, PCI Slot X, Storport Miniport Driver** (your adapter model will be displayed here).
13. Click **Next**.
14. Click **Finish**.

The driver installation is complete. The driver should start automatically. If the adapter is connected to a SAN or data storage device, a blinking yellow light on the back of the HBA will indicate a link up condition.

Manually Installing the Driver Utilities

Run the full driver kit installer. Select the **Create AutoPilot Installer Kit** option, clear the **Perform AutoPilot Installation** option and click **Next**. After the files have been copied to your system, the Finish page will show where the files have been placed. Click **Finish**. A Utilities folder will exist in the folder created by the installer.

To install the full utility set (including the HBAnyware utility GUI):

1. Run SetupCommon.exe
2. Run Setup.exe.

Caution: Run Setup.exe only after running SetupCommon.exe.

3. Follow the instructions on the setup windows.
4. Click **Finish** in the Finish page to exit setup. The utility installation has completed. The HBAnyware utility automatically starts running.

To install the core utility set:

1. cd to the Core folder in the Utilities folder.
2. Run setupCLI.exe.
3. Click **Finish** in the Finish page to exit setup. The core installation has completed.

HBAnyware Security Configurator

Installing the HBAnyware Security Configurator

After the HBAnyware utility and remote server are installed on a group of systems, the utility can remotely access and manage the Emulex adapters on any systems in the group. This may not be desirable because any system with remote access can perform actions such as resetting boards or downloading firmware. The HBAnyware Security Configurator controls which HBAnyware systems can remotely access and manage adapters on other systems in a Storage Area Network (SAN). HBAnyware security is system-based, not user-based. As a result, anyone who can access a system with HBAnyware client access to remote adapters can manage those adapters.

The Emulex driver and the HBAnyware utilities must be installed before you can install the HBAnyware Security Configurator.

To install the HBAnyware Security Configurator:

1. Locate the SSCsetup.exe file. The default path for this file is:
C:\Program Files\Util\HBAnyware
2. Double-click the SSCsetup.exe file. A welcome page appears.
3. Click **Next**. The Setup Status window is displayed. After setup completes, the Emulex HBAnyware Security Setup Completed window appears.
4. Click **Finish**.

HBAnyware Utility Web Launch Procedures

Installing the HBAnyware Utility Web Launch Feature

In addition to the driver and HBAnyware utilities, the following software must be installed before you can install the Web Launch feature:

- Microsoft Internet Information Services (IIS) Server. See the Microsoft Web site for information on downloads and installation.
- Java Runtime Environment (JRE). See the <http://java.com> Web site for information on downloads and installation.

To install the HBAnyware Utility Web launch feature:

1. Click **Programs>Emulex >HBAnyware WebLaunch Install**. Web Launch installation begins.
2. Type the URL address that you want HBAnyware Web Launch to use.



HBAnyware Web Launch, Update URL screen

Updating the HBAware Utility Web Launch URL

The driver, HBAware utilities and HBAware Web Launch must be installed before you can update the URL.

To change the IP address for HBAware Web Launch:

1. Copy Web Launch-related files to a sub-folder called WebLaunch in the HBAware installation folder.
2. Click on **Programs>Emulex>HBAware WebLaunch Update URL**.

Uninstallation

Uninstalling HBAware Web Launch

To uninstall HBAware Web Launch, but leave the HBAware utility installed:

1. Select **Start> Programs>Emulex>HBAware WebLaunch Uninstall**. The following screen appears:

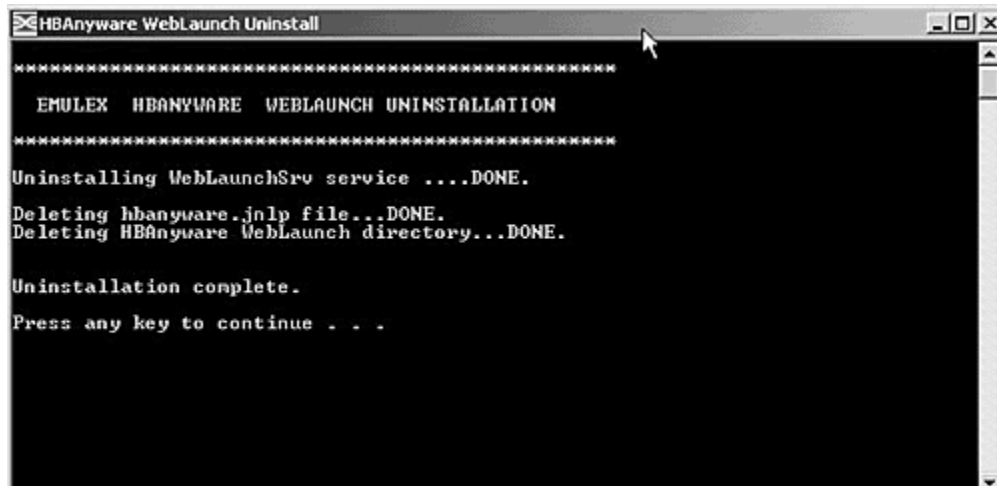


Figure 5: HBAware Web Launch, Uninstallation screen

2. HBAware Web Launch is removed. Press any key to continue.

Uninstalling Programs

To uninstall the HBAware utilities and AutoPilot Installer on a Windows Server 2003 system:

1. Open the **Add or Remove Programs** control panel.
2. Select **Emulex HBAware** or **Emulex HBAware CLI** in the program list and click **Remove**.
3. Click **Yes**. The application is removed from the system. Click **OK**.
4. If you installed the full driver package:
 - a. Select **Emulex Common SAN Management**.
 - b. Click **Remove**.
 - c. Click **Yes**.
The services are stopped and removed. Click **OK**.
5. At this point you can reinstall the utilities by running AutoPilot Installer. To remove AutoPilot Installer:
 - a. Select **Emulex Storport Miniport Driver Kit** or **Emulex Storport Miniport Driver Core Kit**.
 - b. Click **Remove**.
 - c. Click **Yes**.
The installer files are removed from the system. Click **OK**.

To uninstall the HBAnyware utilities and AutoPilot Installer on a Vista or Windows Server 2008 system:

1. Open the **Programs and Features** control panel.
2. Select **Emulex HBAnyware** or **Emulex HBAnyware CLI** in the program list and click the **Uninstall** icon in the tool bar above the program list. If you have User Access Control enabled, click **Continue** when asked for permission.
3. Click **Yes**. The application is removed from the system. Click **OK**.
4. If you installed the full driver package:
 - a. Select **Emulex Common SAN Management**.
 - b. Click the **Uninstall** icon. If you have User Access Control enabled, click **Continue** when asked for permission.
 - c. Click **Yes**.
The services are stopped and removed. Click **OK**.

Note: If you do not want to use the Control Panel, you can execute a batch file to perform the uninstallation.

The batch file is typically in "C:\Program Files\Emulex\Util\Uninstall".

For HBAnyware, it is uninstall_HBAnyware.bat.

For HBAnyware CLI, it is uninstall_HBAnyware_CLI.bat.

For Emulex Common SAN Management, it is uninstall_CommonSAN.bat.

5. At this point you can reinstall the utilities by running AutoPilot Installer. To remove AutoPilot Installer:
 - a. Select **Emulex Storport Miniport Driver Kit** or **Emulex Storport Miniport Driver Core Kit**.
 - b. Click the **Uninstall** icon. If you have User Access Control enabled, click **Continue** when asked for permission.
 - c. Click **Yes**.
The installer files are removed from the system. Click **OK**.

To uninstall the HBAnyware utilities and AutoPilot Installer on a Server Core system:

1. cd to the "Program Files" folder on an x86 system or the "Program Files (x86)" folder on a 64-bit system.
2. cd to "Emulex\Util\Uninstall".
3. Run "uninstall_HBAnyware_CLI.bat".
You may now delete the "Emulex\Util" folder. You may also delete the Emulex folder if it is now empty.
4. To remove AutoPilot Installer, continue with the following steps.
 - a. cd to the "Program Files" folder (on both x86 systems and 64-bit systems).
 - b. cd to "Emulex\AutoPilot Installer".
 - c. Run "uninstall_elx_core_kit.bat". The installer files are removed from the system.

On all platforms, the reports folder in the "Emulex\AutoPilot Installer" folder is not removed, so you can still view installation history and see which drivers have been installed on the system. You may delete the reports folder at any time if you want.

Uninstalling the Emulex Drivers

The Emulex Storport Miniport and PLUS (ElxPlus) drivers are uninstalled using the Device Manager.

To uninstall the Emulex Storport Miniport driver:

1. Select **Start>All Programs>Administrative Tools>Computer Management**.
2. Click **Device Manager**.
3. Double-click the adapter from which you want to remove the Storport Miniport driver. A device-specific console window is displayed. Select the **Driver** tab.
4. Click **Uninstall** and click **OK** to uninstall.

To uninstall the ElxPlus driver (uninstall the ElxPlus driver only if all adapters and installations of Emulex miniport drivers are uninstalled):

After running Device Manager (steps 1 and 2 above):

1. Click the plus sign (+) next to the Emulex PLUS driver class.
2. Right-click the Emulex driver and click **Uninstall**.
3. Click **OK** in the Confirm Device Removal window.

To uninstall or update an earlier version of the Storport Miniport driver (prior to version 1.20), you must remove the registry settings for the adjunct driver prior to manually installing a new driver.

To remove the adjunct driver registry settings:

1. Browse to the Storport Miniport driver version 1.20 (or later) driver kit that you downloaded and extracted.
2. Double-click on the deladjct.reg file. A Registry Editor window appears to confirm that you want to execute deladjct.reg.
3. Click **Yes**. The elxadjct key is removed from the registry.

Configuration

Introduction

The Emulex Storport Miniport driver has many options that you can modify to provide for different behavior. You can set Storport Miniport driver parameters using the HBAnyware version 4.0 utility. See the HBAnyware version 4.0 User Manual for driver parameter details and more information on using the HBAnyware utility to configure the driver.

Server Performance

I/O Coalescing

I/O Coalescing is enabled and controlled by two driver parameters: CoalesceMsCnt and CoalesceRspCnt. The effect of I/O Coalescing will depend on the CPU resources available on the server. With I/O Coalescing turned on, interrupts are batched, reducing the number of interrupts and maximizing the number of commands processed with each interrupt. For heavily loaded systems, this will provide better throughput.

With I/O Coalescing turned off (the default), each I/O processes immediately, one CPU interrupt per I/O. For systems not heavily loaded, the default will provide better throughput. The following table shows recommendations based upon the number of I/Os per adapter.

Table 4: Recommended Settings for I/O Coalescing

I/Os per Second	Suggested CoalesceMsCnt	Suggested CoalesceRspCnt
I/Os < 10000	0	8
10000 < I/Os < 18000	1	8
18000 < I/Os < 26000	1	16
I/Os > 26000	1	24

CoalesceMsCnt

The CoalesceMsCnt parameter controls the maximum elapsed time in milliseconds that the adapter waits before it generates a CPU interrupt. The value range is 0 - 63 (decimal) or 0x0 - 0x3F (hex). The default is 0 and disables I/O Coalescing.

CoalesceRspCnt

The CoalesceRspCnt parameter controls the maximum number of responses to batch before an interrupt generates. If CoalesceRspCnt expires, an interrupt generates for all responses collected up to that point. With CoalesceRspCnt set to less than 2, response coalescing is disabled and an interrupt triggers for each response. The value range for CoalesceRspCnt is 1 - 255 (decimal) or 0x1 - 0xFF (hex). The default value is 8.

Note: A system restart is required to make changes to CoalesceMsCnt and/or CoalesceRspCnt.

Performance Testing

There are four driver parameters that need to be considered (and perhaps changed from the default) for better performance testing: QueueDepth, NumFcpContext, CoalesceMsCnt and CoalesceRspCnt.

Note: Parameter values recommended in this topic are for performance testing only and not for general operation.

QueueDepth

If the number of outstanding I/Os per device is expected to exceed 32, increase this parameter to a value greater than the number of expected I/Os per device, up to a maximum of 254. The QueueDepth parameter defaults to 32. If 32 is set and not a high enough value, performance degradation may occur due to Storport throttling its device queue.

NumFcpContext

If the number of outstanding I/Os per adapter is expected to exceed 512, increase this parameter to a value greater than the number of expected I/Os per adapter. Increase this value in stages: from 128 to 256 to 512 to 1024 to a maximum of 2048. NumFcpContext limits the number of outstanding I/Os per adapter, regardless of how QueueDepth is set. The NumFcpContext defaults to 512. If NumFcpContext is too small relative to the total number of outstanding I/Os on all devices combined, performance degradation may occur due to I/O stream throttling.

CoalesceMsCnt

CoalesceMsCnt defaults to zero. If you are using a performance evaluation tool such as IOMETER and if you expect the I/O activity will be greater than 8000 I/Os per second, set CoalesceMsCnt to 1 and reinitialized with an adapter reset or system reboot.

CoalesceRspCnt

CoalesceRspCnt defaults to 8. For all other values up to the maximum of 63, the adapter will not interrupt the host with a completion until either CoalesceMsCnt milliseconds has elapsed or CoalesceRspCnt responses are pending. The value of these two driver parameters reduces the number of interrupts per second which improves overall CPU utilization. However, there is a point where the number of I/Os per second is small relative to CoalesceMsCnt and this will slow down the completion process, causing performance degradation.

Performance Testing Examples

Test Scenario One

You execute IOMETER with an I/O depth of 1 I/O per device in a small-scale configuration (16 devices). In this case, the test does not exceed the adapter's performance limits and the number of I/Os per second are in the low thousands.

Recommendation: set CoalesceMsCnt to 0 (or leave the default value).

Test Scenario Two

You execute IOMETER with an I/O depth of 48 I/Os per device in a small-scale configuration (16 devices).

Recommendation: set QueueDepth to be greater than 48 (e.g. 64) and NumFcpContext to be greater than 512 (e.g. 1024).

Troubleshooting

Introduction

There are several circumstances in which your system may operate in an unexpected manner. The Troubleshooting section contains reference tables on event codes and error messages and provides information regarding unusual situations.

Event Tracing (Windows Server 2003, SP1 and later only)

Trace messages are part of the Emulex lpfc log messages.

Storage Event Tracing supports two types of events:

- FFInit (0x00000001) - events that occurred at HwFindAdapter and HwInitialize.
- FFIO (0x00000002) - events that occurred during I/O.

Storage Event Tracing supports four levels of events:

- DbgLvlErr (0x00000001) - error level
- DbgLvlWrn (0x00000002) - warning level
- DbgLvlInfo (0x00000004) - Information level
- DbgLvlInfo (0x00000008) - excessive information level

Note: To view trace messages, you must enable Event Tracing in the operating system. See your Microsoft operating system documentation for more information.

Table 5: Event Tracing Summary Table

LOG Message Definition	From	To	Reserved Through	Verbose Description
ELS	0100	0130	0199	ELS events
Discovery	0202	0262	0299	Link discovery events
Mailbox	0310	0326	0399	Mailbox events
INIT	0400	0463	0499	Initialization events
FCP	0701	0749	0799	FCP traffic history events
Link	1300	1306	1399	Link events
Tag	1400	1401	1499	
NPIV	1800	1804	1800	N_Port_ID virtualization events

Event Trace Messages

ELS Log Messages (0100 - 0130)

lpfc_mes0100: 0100: FLOGI failure - ulpStatus: x%x, ulpWord[4]:x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric failed.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check fabric connection.

SEE ALSO: lpfc_mes0110.

lpfc_mes0101: 0101: FLOGI completes successfully - NPortId: x%x, RaTov: x%x, EdTov: x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric succeeded.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0102: 0102: PLOGI completes to NPortId: x%x

DESCRIPTION: The adapter performed a PLOGI into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0103: 0103: PRLI completes to NPortId: x%x, TypeMask: x%x, Fcp2Recovery: x%x

DESCRIPTION: The adapter performed a PRLI into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0104: 0104: ADISC completes to NPortId x%x

DESCRIPTION: The adapter performed an ADISC into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0105: 0105: LOGO completes to NPortId: x%x

DESCRIPTION: The adapter performed a LOGO into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0112: 0112: ELS command: x%x, received from NPortId: x%x

DESCRIPTION: Received the specific ELS command from a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

REMARKS: lpfc_mes0114 and lpfc_mes0115 are also recorded for more details if the corresponding SEVERITY level is set. You can use the XRI to match the messages.

lpfc_mes0114: 0114: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its FC service parameters match this adapter. Request can be accepted.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0112.

lpfc_mes0115: 0115: Unknown ELS command: x%x, received from NPortId: x%x\n

DESCRIPTION: Received an unsupported ELS command from a remote NPORT.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check remote NPORT for potential problem.

SEE ALSO: lpfc_mes0112.

lpfc_mes0128: 0128: Accepted ELS command: OpCode: x%x

DESCRIPTION: Accepted ELS command from a remote NPORT.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0129: 0129: Rejected ELS command: OpCode: x%x

DESCRIPTION: Rejected ELS command from a remote NPORT.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0130: 0130: ELS command error: ulpStatus: x%x, ulpWord[4]: x%x

DESCRIPTION: ELS command failure

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check remote NPORT for potential problem.

Discovery Log Messages (0202 - 0262)

lpfc_mes0202: 0202: Start Discovery: Link Down Timeout: x%x, initial PLOGICount:%d

DESCRIPTION: Device discovery/rediscovery after FLOGI, FAN or RSCN has started. TMO is the current value of the soft link time. It is used for link discovery against the LinkDownTime set in parameters. DISC CNT is number of nodes being discovered for link discovery. RSCN CNT is number of nodes being discovered for RSCN discovery. There will be value in either DISC CNT or RSCN CNT depending which discovery is being performed.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0204: 0204: Discovered SCSI Target: WWN word 0: x%x, WWN word 1: x%x, DID: x%x, RPI: x%x

DESCRIPTION: Device discovery found SCSI target.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0214: 0214: RSCN received: Word count:%d

DESCRIPTION: Received RSCN from fabric.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0215: 0215: RSCN processed: DID: x%x

DESCRIPTION: Processed RSCN from fabric.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0225: 0225: Device Discovery completes

DESCRIPTION: This indicates successful completion of device (re)discovery after a link up.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0229: 0229: Assign SCSIId x%x to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: The driver assigned a SCSI ID to a discovered mapped FCP target. BindType - 0: DID 1:WWNN 2:WWPN

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0230: 0230: Cannot assign SCSIId to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: SCSI ID assignment failed for discovered target.

SEVERITY: Warning

LOG: LOG_ELS verbose

ACTION: Review system configuration.

lpfc_mes0232: 0232: Continue discovery at sequence number%d, PLOGIs remaining:%d

DESCRIPTION: NPort discovery sequence continuation.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0235: 0235: New RSCN being deferred due to RSCN in process

DESCRIPTION: An RSCN was received while processing a previous RSCN.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0236: 0236: Issuing command to name server" type: x%x

DESCRIPTION: The driver is issuing a nameserver request to the fabric. Also recorded if a GID_FT is sent.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0239 or lpfc_mes0240.

lpfc_mes0238: 0238: NameServer response DID count:%d

DESCRIPTION: Received a response from fabric name server with N DIDs.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0239: 0239: NameServer Response: next DID value: x%x

DESCRIPTION: The driver received a nameserver response. And, this message is recorded for each DID included in the response data.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0236.

lpfc_mes0240: 0240: NameServer Response Error - CmdRsp:x%x, ReasonCode: x%x, Explanation x%x

DESCRIPTION: The driver received a nameserver response containing a status error.

SEVERITY: Error

LOG: LOG_DISCOVERY verbose

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

SEE ALSO: lpfc_mes0236.

lpfc_mes0256: 0256: Start node timer on NPortId: x%x, timeout value:%d

DESCRIPTION: Starting timer for disconnected target with NPort ID and timeout value.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0260: 0260: Stop node timer on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Discontinuing timer for reconnected target with NPort ID and SCSI ID.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0262: 0262: Node timeout on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Disconnected NPort ID, SCSI ID has failed to reconnect within timeout limit.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Review system configuration.

Mailbox Log Messages (0310 - 0326)

lpfc_mes0310: 0310: Mailbox command timeout - HBA unresponsive

DESCRIPTION: A Mailbox command was posted to the adapter and did not complete within 30 seconds.

sync - 0: asynchronous mailbox command is issued 1: synchronous mailbox command is issued.

SEVERITY: Error

LOG: LOG_MBOX verbose

ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If these problems persist, report these errors to Technical Support.

lpfc_mes0326: 0326: Reset HBA - HostStatus: x%x

DESCRIPTION: The adapter has been reset.

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

INIT Log Messages (0400 - 0463)

lpfc_mes0400: 0400 Initializing discovery module: OptionFlags: x%x

DESCRIPTION: Driver discovery process is being initialized with internal flags as shown.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0401: 0401: Initializing SLI module: DeviceId: x%x, NumMSI:%d

DESCRIPTION: PCI function with device id and MSI count as shown is being initialized for service level interface.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0405: Service Level Interface (SLI) 2 selected\n");

DESCRIPTION: Service Level Interface level 2 is selected.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0406: 0406: Service Level Interface (SLI) 3 selected\n");

DESCRIPTION: Service Level Interface level 3 is selected.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0436: Adapter not ready: hostStatus: x%x

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0442: 0442: Adapter failed to init, CONFIG_PORT, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CONFIG_PORT mailbox command.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0446: 0446: Adapter failed to init, CONFIG_RING, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CFG_RING mailbox command.

SEVERITY:

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0454: 0454: Adapter failed to init, INIT_LINK, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing INIT_LINK mailbox command.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0458: 0458: Bring Adapter online

DESCRIPTION: The FC driver has received a request to bring the adapter online. This may occur when running HBAnyware.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

lpfc_mes0460: 0460: Bring Adapter offline

DESCRIPTION: The FC driver has received a request to bring the adapter offline. This may occur when running HBAnyware.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

lpfc_mes0463: 0463: Adapter firmware error: hostStatus: x%x, Info1(0xA8): x%x, Info2 (0xAC): x%x

DESCRIPTION: The firmware has interrupted the host with a firmware trap error.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: Review HBAnyware diagnostic dump information.

FCP Log Messages (0701 - 0749)

lpfc_mes0701: 0701: Issue Abort Task Set to PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: The driver has issued a task management command for the indicated SCSI device address.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: Review system configuration.

lpfc_mes0703: 0703: Issue LUN reset to PathId: x%x, TargetId: x%x, Lun: x%x, Did: x%x

DESCRIPTION: Storport is requesting a reset of the indicated LUN.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

lpfc_mes0713: 0713: Issued Target Reset to PathId:%d, TargetId:%d, Did: x%x

DESCRIPTION: Storport detected that it needs to abort all I/O to a specific target. This results in login reset to the target in question.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

SEE ALSO: lpfc_mes0714.

lpfc_mes0714: 0714: Issued Bus Reset for PathId:%d

DESCRIPTION: Storport is requesting the driver to reset all targets on this adapter.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

SEE ALSO: lpfc_mes0713.

lpfc_mes0716: 0716: FCP Read Underrun, expected%d, residual%d

DESCRIPTION: FCP device provided less data than was requested.

SEVERITY: Supplement Information

LOG: LOG_FCP verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0730.

lpfc_mes0729: 0729: FCP command error: ulpStatus: x%x, ulpWord[4]: x%x, XRI: x%x, ulpWord[7]: x%x

DESCRIPTION: The specified device failed an I/O FCP command.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

REMARKS: lpfc_mes0730 is also recorded if it is a FCP Rsp error.

lpfc_mes0730: 0730: FCP response error: Flags: x%x, SCSI status: x%x, Residual:%d

DESCRIPTION: The FCP command failed with a response error.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

remark: lpfc_mes0716, lpfc_mes0734, lpfc_mes0736 or lpfc_mes0737 is also recorded for more details if the corresponding SEVERITY level is set.

SEE ALSO: lpfc_mes0729.

lpfc_mes0734: 0734: Read Check: fcp_parm: x%x, Residual x%x

DESCRIPTION: The issued FCP command returned a Read Check Error.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

SEE ALSO: lpfc_mes0730.

lpfc_mes0737: 0737: SCSI check condition, SenseKey x%x, ASC x%x, ASCQ x%x, SrbStatus: x%x

DESCRIPTION: The issued FCP command resulted in a Check Condition.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review SCSI error code values.

SEE ALSO: lpfc_mes0730.

0747: Target reset complete: PathId: x%x, TargetId: x%x, Did: x%x

DESCRIPTION: A target reset operation has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0713.

0748: Lun reset complete: PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: A LUN reset operation has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0703.

0749: Abort task set complete: Did: x%x, SCSIId: x%x

DESCRIPTION: A task management has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0701.

Link Log Messages (1302 - 1306)

lpfc_mes1302: 1302: Invalid speed for this board:%d, forced link speed to auto

DESCRIPTION: The driver is re-initializing the link speed to auto-detect.

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: None required.

lpfc_mes1303: 1303: Link Up event: tag: x%x, link speed:%dG, topology (0 = Pt2Pt, 1 = AL):%d

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check physical connections to the FC network.

REMARKS: lpfc_mes1304 is recorded if Map Entries > 0 and the corresponding mode and SEVERITY level is set.

lpfc_mes1305: 1305: Link down even: tag x%x

DESCRIPTION: A link down event was received.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check physical connections to the FC network.

lpfc_mes1306: 1306: Link Down timeout

DESCRIPTION: The link was down for greater than the configuration parameter (HLinkTimeOut) seconds. All I/O associated with the devices on this link will be failed.

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: Check adapter cable/connection to SAN.

Tag Messages (1400 - 1401)

lpfc_mes1400 1400: Tag out of range: ContextIndex: x%x, MaxIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: Review hardware configuration. Contact Emulex Technical Support.

lpfc_mes1401 1401: Invalid tag: ContextIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: Review hardware configuration. Contact Emulex Technical Support.

NPIV Messages (1800 - 1899)

lpfc_mes1800 1800: NPIV FDISC failure VPI: x%x Error x%x Reason x%x

DESCRIPTION: Virtual Port fails on a FDISC to the switch with the error and reason listed.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Check to ensure the switch supports NPIV.

lpfc_mes1801 1801: Memory allocation failure for NPIV port: x%x

DESCRIPTION: Fails to allocated the block of memory for the Virtual Port.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Check to ensure system has sufficient kernel memory.

lpfc_mes1802 1802: Exceeded the MAX NPIV port: x%x

DESCRIPTION: Exceeded the number of Virtual Port allows on the HBA.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Reduce the number of Virtual Ports.

lpfc_mes1803 1803: Virtual Port: x%x VPI:x%x successfully created.

DESCRIPTION: Virtual Port ID is successfully created.

SEVERITY: Information

LOG: LOG_NPIV verbose

ACTION: No action needed, informational.

lpfc_mes1804 1804: Removing Virtual Port: x%x VPI:x%x

DESCRIPTION: Removing Virtual Port ID.

SEVERITY: Information

LOG: LOG_NPIV verbose

ACTION: No action needed, informational.

ELS Messages (1900 - 1999)

1900: x%x sends ELS_AUTH_CMD x%x with TID x%x

DESCRIPTION: An ELS_AUTH_CMD is sent.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1901: x%x sends ELS_AUTH_REJECT x%x x%x to x%x

DESCRIPTION: An ELS_AUTH_REJECT is sent.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1902: Receives x%x from x%x in state x%x

DESCRIPTION: Receives an ELS_AUTH_CMD.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1903: Receives ELS_AUTH_RJT x%x x%x

DESCRIPTION: Receives an ELS_AUTH_REJECT.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1904: Authentication ends for x%x with status x%x (%d %d)

DESCRIPTION: Authentication is done.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1905: Authentication policy change for local x%08x x%08x remote x%08x%08x

DESCRIPTION: Authentication policy has been changed.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

Error Log

Viewing the Error Log

The system event log is a standard feature of Windows Server 2003.

To view the error LOG:

1. Open the Event Viewer window:
 - Click **Start>Programs>Administrative Tools>Event Viewer**
 - or
 - Right-click on **My Computer**, **Manage** and **Event Viewer** in **Computer Management**.

The Event Viewer window is displayed.

2. Double-click any event with the source name ELXSTOR.
3. Examine the entry at offset 0x10 and Event ID 11.

Severity Scheme

When the Event Viewer is launched, there are three branches: Application, Security and System. All ELXSTOR error log entries are found under the System branch and all ELXSTOR error log entries have the Event Viewer severity level of “error”.

- A severe error code indicates that the driver, firmware or adapter is behaving abnormally and your intervention is required to correct the problem.
- A malfunction error code indicates that there is a problem with the system, but your intervention is not required.
- A command error code indicates that an event has transpired, but does not require your intervention. An event may be problem-oriented, such as an invalid fabric command sub-type. An event may not be problem-oriented, such as exhausted retries on PLOGI or PDISC.

Related Driver Parameter: LogError

The LogError driver parameter determines the minimum severity level to enable entry of a logged error into the system.

- If set to 0 = all errors regardless of severity are logged.
- If set to 1 = severe, malfunction and command level errors are logged.
- If set to 2 = both severe and malfunction errors are logged.
- If set to 3 = only severe errors are logged.

Note: See the Configuration Section for instructions on how to set driver parameters.

Format of an Error Log Entry

An error log entry will take the form of an event. This event is described by:

- Date (date entry was logged)
- Source (elxstor)
- Time (time entry was logged)
- Category (none)
- Type (error)
- Event id (0)
- User (N/A)
- Computer (name of computer)

The relevant word from the elxstor point of view is at offset 0x10. Bits 0 - 7 of the word at offset 0x10 are the error code.

Error Codes Tables

Table 6: Severe Errors

Bits 0 -7	Interpretation
0x00	Failed to allocate PCB
0x01	Failed to allocate command ring
0x02	Failed to allocate response ring
0x03	Failed to allocate mailbox context
0x04	Read revision failed
0x05	Invalid adapter type
0x06	Invalid adapter type
0x07	Write of non-volatile parameters failed
0x08	Invalid link speed selection
0x09	Read configuration failed
0x0A	Set variable failed
0x0B	Configure port failed
0x0D	Configure ring 0 failed
0x0E	Configure ring 1 failed
0x0F	Configure ring 2 failed
0x10	Configure ring 3 failed
0x11	Initialize link failed
0x12	Port ready failed
0x13	Read revision failed
0x14	Invalid adapter type
0x15	Invalid adapter type
0x17	Set variable command failed
0x18	Configure port failed
0x19	Configure ring 0 failed
0x1A	Configure ring 1 failed
0x1B	Configure ring 2 failed
0x1C	Configure ring 3 failed
0x1E	Context pool initialization failure
0x1F	Context pool initialization failure
0x20	Context pool initialization failure
0x24	Firmware trap: fatal adapter error
0x25	Non-specific fatal adapter error (bits 8-31 will indicate type)
0x27	FCoE chip is running Golden firmware
0x28	FCoE chip is running Diagnostic firmware
0x29	Recoverable adapter error: device has been auto-restarted
0x2A	Mailbox command time-out
0x2B	Invalid FRU data found on adapter

Table 6: Severe Errors (Continued)

Bits 0 -7	Interpretation
0x2D	Invalid-Illegal response IOCB
0x2E	Invalid-response IOCB
0x2F	Invalid-response IOCB
0x30	Mailbox context allocation failure
0x34	Mailbox context allocation failure
0x35	Mailbox context allocation failure
0x37	Mailbox context allocation failure
0x3D	Mailbox context allocation failure
0x41	Mailbox context allocation failure
0x42	Mailbox context allocation failure
0x44	ELS FLOGI command context allocation failure
0x47	Mailbox context allocation failure
0x4D	Mailbox context allocation failure
0x51	Request to ADISC a non-existent node
0x52	ELS ADISC command context allocation failure
0x56	Mailbox context allocation failure
0x57	Mailbox context allocation failure
0x58	ELS LOGO command context allocation failure
0x5C	ELS PRLI command context allocation failure
0x5E	ELS RLIR command context allocation failure
0x64	Create XRI command context allocation failure
0x67	Name server command context allocation failure
0x6E	Close XRI command context allocation failure
0x6F	State change registration failure
0x70	ELS receive context allocation failure
0x72	ELS receive PLOGI context allocation failure
0x74	Mailbox context allocation failure
0x77	Mailbox context allocation failure
0x7A	ELS receive LOGO context allocation failure
0x7D	Mailbox context allocation failure
0x7E	Mailbox context allocation failure
0x7F	Mailbox context allocation failure
0x80	Mailbox context allocation failure
0x81	Mailbox context allocation failure
0x84	ELS FDISC context allocation failure
0x85	Mailbox context allocation failure
0x88	ELS PLOGI command context allocation failure
0x89	ELS RSCN registration command context allocation failure

Table 6: Severe Errors (Continued)

Bits 0 -7	Interpretation
0xA0	Port object construction failed
0xA4	Unsupported command type (command type in bits 8 - 31)
0xC0	Failed to allocate un-cached extension
0xC1	Port initialization failure
0xC2	Utility mailbox command timeout
0xC3	Fatal over-temperature condition
0xC4	Over-temperature warning condition
0xC5	Over-temperature warning condition alleviated
0xC6	Invalid response IOCB
0xC7	Initialization failed due to exceeding max driver instances (256)
0xC8	Initialization failed due to STORPORT.SYS revision level too low
0xEC	Failed to allocate authentication context

Table 7: Malfunction Errors

Bits 0 - 7	Interpretation
0x0C	Set variable failed
0x26	Spurious mailbox attention
0x31	Unrecognized mailbox completion command code
0x33	Invalid link state
0x36	Initialization command failed (status in bits 8 -31)
0x3B	Discovery error due to lack of resources (insufficient RPIs)
0x3E	Unable to create discovered node object
0x3F	Failed to issue ELS process login (PRLI) command
0x45	Retries exhausted to ELS FLOGI
0x47	Failed to issue UNREG_VPI
0x48	No exchange available for extended link service request (ELS) command
0x4C	Exhausted retries on ELS PLOGI
0x53	WWPN mismatch on ADISC response
0x54	WWNN mismatch on ADISC response
0x55	Exhausted retries on ELS ADISC
0x59	Exhausted retries on ELS LOGO
0x5B	Attempted ELS PRLI non-existent node
0x5D	Exhausted retries on ELS PRLI
0x63	Attempt to issue command to fabric without a valid fabric login
0x65	Error issuing fabric command (status in bits 8 - 31)
0x66	Invalid fabric command type
0x6A	Invalid fabric command sub-type
0x6C	Name server response error (status in bits 8 - 31)
0x6D	Name server response error (status in bits 8 - 31)

Table 7: Malfunction Errors (Continued)

Bits 0 - 7	Interpretation
0x6F	SCN registration failed
0x71	Received unsupported ELS command (type in bits 8 - 31)
0x76	Invalid format for received PRLI
0x83	Node object-allocation failure
0x9A	SCSI command error (SCSI status in bits 8 - 31)
0xA2	Generalized command context allocation failure
0xA8	Read check error (parameter in bits 8 -31)
0xAA	Node time-out (DID in bits 8 -31)
0xF0	Spurious link attention
0xF1	Spurious link attention with previous state change

Table 8: Command Errors

Bits 0 - 7	Interpretation
0x32	Insufficient context for attention handling
0x49	ELS command error (status in bits 8 - 31)
0x4A	ELS command failure
0x90	ELS FDISC completed (NPort ID in bits 24 -31)
0x91	ELS LOGO completed (NPort ID in bits 8 - 31)
0x92	ELS LOGO received from fabric
0x93	ELS FLOGI completed (NPort ID in bits 8 -31)
0x94	ELS PLOGI completed (NPort ID in bits 8 -31)
0x95	Discovered SCSI target (NPort ID in bits 8 -31)
0x96	ELS RSCN received (count in bits 8 -15, vpi in bits 24 - 31)
0x97	Assigned SCSI address to discovered target (address in bits 8 - 31)
0x98	Name server response (count in bits 8 - 31)
0x9B	SCSI check condition (sense codes in bits 8 - 31)
0xA3	Local error on FCP command completion (status in bits 8 - 31)
0xA6	Data over-run
0xA7	Non-specific FCP error (info in bits 8 - 31)
0xA9	Local error (status in bits 8 - 31)
0xAB	Pass-through command error (status in bits 8 - 31)
0xAC	Local error on report LUN completion (status in bits 8 -31)

Table 9: Event Indications

Bits 0 - 7	Interpretation
0x21	Port re-initialization complete: now off-line
0x22	Port shutdown complete
0x23	Port re-initialization complete: now on-line
0xA5	Data under-run (residual in bits 8 - 31)
0xD0	NPIV Virtual Port creation success (Virtual Port Did in bits 8 - 31)

Table 9: Event Indications

0xD1	NPIV Virtual Port creation failed (Virtual Port Index in bits 8 - 31)
0xD2	NPIV Virtual Port FDISC failed (Virtual Port index in bits 8 - 31)
0xD3	NPIV Virtual Port memory allocation failed (Virtual Port index in bits 8 - 31)
0xD4	Exceeded maximum Virtual Port supported (Virtual Port index in bits 8 - 31)
0xD5	NPIV Virtual Port removal (Virtual Port Did in bits 8 - 31)
0xE0	Authenticated successfully (remote Did in bits 8 - 31)
0xE1	Failed to authenticate (remote Did in bits 8 - 31)
0xE2	Authentication not supported (remote Did in bits 8 - 31)
0xE3	Authenticated ELS command timeout (remote Did in bits 8 - 31)
0xE4	Authentication transaction timeout (remote Did in bits 8 -31)
0xE5	LS_RJT other than Logical Busy received for Authentication transaction (remote Did in bits 8 - 31)
0xE6	LS_RJT Logical Busy received for Authentication transaction (remote Did in bits 8 - 31)
0xE7	Received Authentication Reject other than Restart (remote Did in bits 8 -31)
0xE8	Received Authentication Reject Restart (remote Did in bits 8 -31)
0xE9	Received Authentication Negotiate (remote Did in bits 8 -31)
0xEA	Authenticating spurious traffic (remote Did in bits 8 -31)
0xEB	Authentication policy has been changed (remote Did in bits 8 -31)